

REMARKS

In the Action, claims 1-23 are rejected. In response, claim 1 is amended to delete the reference to the polyether portion of the chain as being “the main chain”.

Independent claims 1, 9 and 13 are also amended to delete the reference to “graft” polymers. The dependent claims are amended to be consistent with the amendments to the independent claims. These amendments are made to clarify the features of the claimed polymer composition and are consistent with the Examiner’s comments regarding the use of the term “graft” polymer. Accordingly, these amendments do not raise new issues after the final rejection.

The previous rejections over the cited art are withdrawn. Claims 1-23 are now rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. In view of the amendments and the following comments, Applicants respectfully submit that the claims are not indefinite and in condition for allowance. Accordingly, reconsideration and allowance are requested.

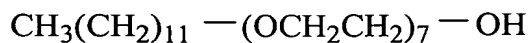
The claims are rejected on the basis that it is not clear what is intended by the phrase “graft polymers” and “at least two graft polymers”. As recognized in the Action, these terms are generally well understood by one of ordinary skill in the art. However, the Action suggests that in light of Applicants’ specification, the use of the terms is unclear. The Action appears to suggest that the resulting composition obtained by the process disclosed in the specification is not a graft copolymer and that the resulting composition does not produce two graft copolymers.

Applicants respectfully disagree with the Examiner’s interpretation of the terms in the claims. However, to obviate this rejection and advance the prosecution, the term “graft” has

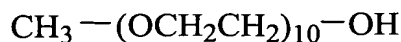
been deleted from the claims. As amended, the claims now recite a polymer composition. In view of these amendments, the claims are allowable.

Applicants submit that the invention is properly defined in the specification and the claims and that the claims are not indefinite to one of ordinary skill in the art. As amended, claim 1 recites a polymer composition comprising at least two polymers. Each of the polymers are produced from a component having a polyether portion and a monoethylenically unsaturated monomer component where the monoethylenically unsaturated monomer forms a polymer chain on the polyether portion. Thus, the claims specifically recite the process for producing polymers. This is also consistent with the specification which discloses forming the polymers from a polyether and a monoethylenically unsaturated monomer and refers to the resulting polymers as “graft” polymers since the monomer is polymerized onto the polyether portion. The Action refers to Example 1 of the specification which discloses forming two graft polymers. However, the Action suggests that the starting materials do not produce a graft copolymer and are not capable of producing a polymer having a weight average molecular weight of 6,600 unless the polyether molecules also polymerize to form a single polymer.

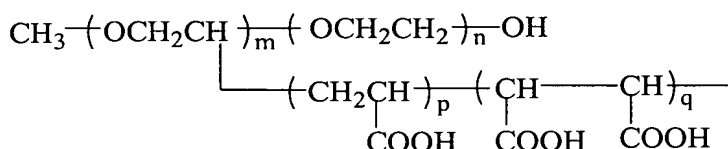
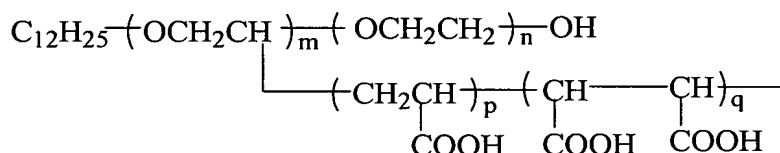
The monomer components and the process described in Example 1 do in fact produce a polymer composition according to the claimed invention. As set forth in Example 1, the resulting polymer composition comprises two polymers (referred to as graft polymers). It is the resulting polymer composition that has the weight average molecular weight of 6,600 and an acid value of 3.59 meq/g. The polymer composition is obtained from a first polyethylene glycol component produced by the reaction of 7 moles of ethylene oxide and a C₁₂ alkyl alcohol. The polyethylene glycol is referred to as “LC-7” and has the formula



The second polyethylene glycol is produced from the reaction of 10 moles of ethylene oxide and methanol. This polyethylene glycol is referred to as "PM-10", and has the formula



The di-tert-butyl peroxide is added dropwise to the reaction mixture to produce a reactive site on a carbon atom of at least one of the polyether repeating groups. Specifically, a hydrogen atom is removed from at least one of the CH_2 groups on the polyethylene glycols to produce at least one CH radical as a reactive site. The maleic anhydride and the acrylic acid polymerize from this reactive site on the polyethylene glycol portion. Accordingly, the resulting composition obtained by carrying out the graft polymerization is a mixture of the two polymers from each of the polyethylene glycols. The weight average molecular weight of 6,600 as disclosed in Example 1 is that of the resulting mixture of the two polymers. Specifically, the resulting composition comprises the following two polymers



where $m + n$ equal the number $-\text{OCH}_2\text{CH}_2-$ groups in the respective polyethylene glycol portion.

The resulting polymer obtained from the LC-7 has 12 carbon atoms in the end structural unit as defined in claim 1. The polymer obtained from the PM-10 has one carbon

atom in the end structural unit as defined in claim 1 such that the difference between the number of carbons in the end structural units is 11.

In view of the above explanation and the specification, Applicants respectfully submit that the invention as recited in the claims is not indefinite and is understood by one of ordinary skill in the art. Furthermore, the use of the terms in the claims as amended is not confusing or indefinite in light of the specification.

The Action appears to suggest that the resulting composition produced according to Example 1 is not capable of attaining a weight average molecular weight of 6,600. However, it appears that the Action estimates the molecular weight of the resulting polymers by ideal numerical calculations based on the stoichiometry of the reaction. However, such ideal reaction schemes seldom occur in practice. Furthermore, the disclosed molecular weight of the resulting polymer composition of the two polymers is a weight average molecular weight and not a number average molecular weight. Thus, the weight average molecular weight disclosed in Example 1 is correct. The stoichiometric calculations in the action appear to presume a narrow and consistent molecular weight range.

The weight average molecular weight of the polymer composition is consistent in all of the Examples. In particular, Comparative Example 1 produces a polymer from "PM-10", maleic anhydride and acrylic acid where the polymer has a weight average molecular weight of 8,300. Comparative Example 2 produces a polymer from "PH-30", maleic acid and acrylic acid where the resulting polymer has a weight-average molecular weight of 6,800. In Comparative Example 5, the polymer of Comparative Example 1 and Comparative Example 2 were blended in a weight ratio of 7/3 so that the resulting polymer composition had a weight-average molecular weight of 7,100.


The Action also suggests that 10 molecules of the polyether are apparently combined or polymerized. However, each of the polyethylene glycols have a single hydroxy group and a terminal alkyl group such that 10 molecules of the polyethylene glycols do not readily polymerize under these conditions as suggested in the Action.

The Action also states that reaction of the polyethylene glycol with an unsaturated monomer is known to produce comb polymers where the backbone material is viewed as the unsaturated monomer material and not the polyethylene glycol component. For the reasons discussed above, Applicants submit that the use of the terms in the claims as amended is not confusing, unclear or indefinite. However, claim 1 is amended to delete the reference to the "main chain" and now refers to the chain including a polyether portion. Accordingly, this amendment is believed to obviate this rejection.

In view of the above discussion, the disclosure in the specification and the Examples, Applicants submit that claim 1 is not indefinite. The same comments apply to independent claim 9 and independent claim 13.

In view of these amendments and the above comments, the claims are submitted to be in proper form under 35 U.S.C. § 112, second paragraph. Accordingly, reconsideration and allowance are requested.

Respectfully submitted,



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